IPMAT IIM Indore 2020(PYSP)

Mock Test Questions & Solutions

Mock Test Solutions in English

Questions

1. The probability that a randomly chosen factor of 10^{19} is a multiple of 10^{15} is

   A. $\frac{1}{25}$

   B. $\frac{1}{12}$

   C. $\frac{1}{20}$

   D. $\frac{1}{16}$

2. The number of acute angled triangles whose sides are three consecutive positive integers and whose perimeter is at most 100 is

   A. 28

   B. 29

   C. 31

   D. 33

3. The equation of the straight line passing thorough the point M(–5, 4), such that the portion of it between the axes is divided by the point M in to two equal halves, is

   A. 10y – 8x = 80

   B. 8y + 10x = 80

   C. 10y + 8x = 80

   D. 8y + 10x + 80 = 0

4. The value of $cos^2\frac{\pi}{8} + cos^2\frac{3\pi}{8} + cos^2\frac{5\pi}{8} + cos^2\frac{7\pi}{8}$ is

   A. 1

   B. $\frac{3}{2}$

   C. 2

   D. $\frac{9}{4}$

5. If $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} +\ldots$ upto $\infty = \frac{\pi^2}{6}$, then value of $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} +\ldots$ upto ∞ is

   A. $\frac{\pi^2}{8}$

   B. $\frac{\pi^2}{16}$

   C. $\frac{\pi^2}{12}$

   D. $\frac{\pi^2}{36}$

6. A man is known to speak the truth on an average 4 out 5 times. He throws a die and reports that it is a five. The probability that it is actually a five is

   A. $\frac{4}{9}$

   B. $\frac{5}{9}$

   C. $\frac{4}{15}$

   D. $\frac{2}{15}$

7. If $\log_5 \log_8 (x^2 - 1) = 0,$ then a possible value of x is

   A. $2\sqrt{2}$

   B. $\sqrt{2}$

C. 2   D. 3

8. Consider the following statements:

(i) When 0 < x < 1, then $\frac{1}{1+x} < 1 - x + x^2$.

(ii) When 0 < x < 1, then $\frac{1}{1+x} > 1 - x + x^2$.

(iii) When −1 < x < 0, then $\frac{1}{1+x} < 1 - x + x^2$.

(iv) When −1 < x < 0, then $\frac{1}{1+x} > 1 - x + x^2$.

Then the correct statement are

A. (i) and (ii)   B. (ii) and (iv)

C. (i) and (iv)   D. (ii) and (iii)

9. Fifty litres of a mixture of milk and water contains 30 percent of water. This mixture is added to eighty litres of another mixture of milk and water that contains 20 percent of water. Then, how many litres of water should be added to the resulting mixture to obtain a final mixture that contains 25 percent of water?

A. 1   B. 2

C. 3   D. 4

10. Three workers working together need 1 hour to construct a wall. The first worker, working alone, can construct the wall twice as fast at the third workder, and can complete the task an hour sooner than the second worker, Then, the average time in hours taken by the three workers, when working alone, to construct the wall is

A. $(\sqrt{33} + 4)/3$ B. $(\sqrt{33} + 5)/3$

C. $(\sqrt{33} + 6)/3$ D. $(\sqrt{33} + 7)/3$

11. In a class, students are assigned roll numbers from 1 to 140. All students with even roll numbers opted for cricket, all those whose roll numbers are divisible by 5 opted for football, and all those whose roll numbers are divisible by 3 opted for basketball. The number of students who did not opt for any of the three sports is

A. 102   B. 38

C. 98   D. 42

12. Given f(x) = x^2 + $\log_3 x$ and g(y) = 2y + f(y), the value of g(3) equals

A. 16
B. 15
C. 25
D. 26

13. A 2× 2 matrix is filled with four distinct integers randomly chosen from the set {1, 2, 3, 4, 5, 6}. Then the probability that the matrix generated in such a way is singular is

A. $\frac{2}{45}$
B. $\frac{1}{45}$
C. $\frac{4}{15}$
D. $\frac{1}{15}$

14. Ashok started a business with a certain investment. After few months, Bharat joined him investing half amount of Ashok's initial investment. At the end of the first year, the total profit was divided between them in ration 3:1. Bharat joined Ashok after

A. 2 months
B. 3 months
C. 4 months
D. 6 months

15. The average marks of 6 students in a test is 64. All the students got different marks, one of the students obtained 70 marks and all other students scored 40 or above. The maximum possible difference between the second highest and the second lowest marks is

A. 50
B. 54
C. 57
D. 58

16. The table below presents tha quoted buy and sell prices of five stocks during the five trading days of a given week. The quoted sell price is the price at which an investor can sell a stock in the market. The quoted buy price is the price at which an investor can buy a stock from the market. All the quoted numbers are in Indian Rupees.

Day	Monday		Tuesday		Wednesday		Thursday		Friday	
Quote	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy
Dabur	460	462	455	458	432	433	444	447	461	462
Marico	345	346	335	336	365	368	372	375	372	374
HUL	1931	1933	1952	1955	1979	1981	2044	2048	1966	1969
ITC	237	238	238	239	246	251	221	225	253	256
Britannia	3044	3046	3100	3101	3110	3115	3025	3027	3140	3144

If an investor had Rs. 36,00,000 to invest in any particular single stock, and she could buy the stock only on Monday and sell it off only on Friday, then the stock she should buy on Monday to earn the maximum possible profit during the week is

A. Marico
B. HUL
C. ITC
D. Britannia

17. If an investor planned to invest Rs. 36,00,000 in purchasing the stocks of HUL on Monday, sell them off on Wednesday and use the entire proceeds to purchase the stocks of Britannia on the same day and sell them off again on Friday, then the total investment return during the week would be

A. 2.80 percent   B. 3.00 percent

C. 3.20 percent   D. 3.40 percent

18. The difference between the quoted buy and sell price of a stock is referred to as the spread of the stock. The average spread of the stocks is lowest on

A. Monday   B. Tuesday

C. Thursday   D. Friday

19. A brokerage firm charges 0.1 percent trading commission on the value of shares bought or sold through its trading platform. If a investor bought 1000 shares of Britannia on Tuesday, and sold all of them on Thursday, then the total brokerage fee that wil be charged from the investor is

A. 6,125   B. 6,126

C. 6,127   D. 6,128

20. If you had decided to invest Rs. 36,00,000 worth of ITC stocks on Monday, then the day of the week you should choose to sell the stocks to earn the maximum possible profit would be

A. Tuesday   B. Wednesday

C. Thurday   D. Friday

21. In a division problem, product of quotient and the remainder is 24 while their sum is 10. If the divisor is 5 then dividend is ____

22. The shortest distance from the point (–4, 3) to the circle $x^2 + y^2 = 1$ is____

23. The value of $0.04^{\log_{\sqrt{5}}\left(\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\cdots\right)}$ is____

24. Suppose $\begin{vmatrix} a & a^2 & a^3-1 \\ b & b^2 & b^3-1 \\ c & c^2 & c^3-1 \end{vmatrix} = 0$, where a, b and c are distinct real number. If a = 3, then the value of abc is____

25. The minimum value of f(x) = |3 – x| + |2+x|+|5-x| is equal to____

26. Ashok purchased pens and pencils in the ratio 2 : 3 during his first visit and paid Rs. 86 to the shopkeeper. During his second visit, he purchdased pens and pencils in the ratio 4:1 and paid Rs. The cost of a pen as well as a pencil in rupees is a positive integer. If Ashok purchased four pens during his second visit, then the amount he paid in rupees for the pens during the second visit is

27. In a four-digit number, the product of thousands digit and units digit is zero while their difference is Product of the middle digits is 18. The thousands digit is as much more than the units digit as the hundreds digit is

more than the tens digit. The four-digit number is ____

28. Out of 80 students who appeared for the school exams in Mathematis (M), Physics (P) and Chemistry (C), 50 passed M, 30 passed P and 40 passed C . At most 20 students passed M and P, at most 20 students passed P and C and at most 20 students passed C and M. The maximum number of students who could have passed all three exams is____

29. Two friends run a 3-kilmeter race along a circular course of length 300 meters. If their speeds are in ratio 3:2, the number of times the winner passes the other is___

30. Out of 13 objects, 4 are indistinguishable and rest are distinct. The number of ways we can choos 4 objects out of 13 objects is____

31. Direction: Read the following passage and choose the answer that is closest for each of the questions that are based on the passage.

"John Muir, Earth-planet, Universe."–These words are written on the inside cover of the notebook from which the contents of this volume have been taken. They reflect the mood in which the late author and explorer undertook his thousand-mile walk to the Gulf of Mexico half-a-century ago. No less does this refreshingly cosmopolitan address, which might have startled any finder of the book, reveal the temper and the comprehensiveness of Mr. Muir's mind. Even at the early age of twenty-nine, his eager interest in every aspect of the natural world had made him a citizen of the universe.

On these expeditions he had disciplined himself to endure hardship, for his notebooks disclose the fact that he often went hungry and slept in the woods, or on the open prairies, with no cover except the clothes he wore.

"Oftentimes," Mr. Muir writes in some unpublished biographical notes, "I had to sleep out without blankets, and also without supper or breakfast. But usually I had no great difficulty in finding a loaf of bread in the widely scattered clearings of the farmers. With one of these big backwoods loaves I was able to wander many a long, wild mile, free as the winds in the glorious forests and bogs, gathering plants and feeding on God's abounding, inexhaustible spiritual beauty bread. Only once in my long Canada wanderings was the deep peace of the wilderness savagely broken. It happened in the maple woods about midnight, when I was cold and my fire was low. I was awakened by the awfully dismal howling of the wolves, and got up in haste to replenish the fire."

Had it not been for the accidental injury to his right eye in the month of March, 1867, he probably would have started somewhat earlier than he did. In a letter written to Indianapolis friends on the day after the

accident, he refers mournfully to the interruption of a long-cherished plan. "For weeks," he writes, "I have daily consulted maps in locating a route through the Southern States, the West Indies, South American, and Europe-a botanical journey studied for years. But, alas, I am half blind. My right eye, trained to minute analysis is lost and I have scarce heart to open the other."

The injury to his eye proved to be less serious than he had at first supposed. In June he was writing to a friend: "I have been reading and botanizing for some weeks, and find that for such work I am not very much disabled."

In an account written after the excursion he says: "I was eager to see Illinois prairies on my way home, so we went to Decatur, near the center of the State, thence. I botanized one week on the prairie about seven miles south west of Pecatonica…. To me all plants are more precious than before. My poor eye is not better, nor worse. A cloud is over it, but in gazing over the widest landscapes, I am not always sensible of its presence."

"John Muir, Earth-planet, Universe." Muir wrote this in his notebook because

A. He did not have a permanent address.

B. He wanted to be a traveler all his life.

C. His love for botany went beyond borders.

D. He wanted to live in the open all his life.

32. Which of these did John Muir have no great difficulty in doing?

A. Finding food among the farmers.

B. Eating regularly every day

C. Sleeping without blankets on certain nights.

D. Chasing wolves that holed through the nights.

33. How did the experience with nature affect John Muir?

A. He felt spiritually fulfilled.

B. He became a better botanist.

C. He felt successful after collecting rare plants.

D. He enjoyed the breeze in the glorious forests.

34. According to the passage, in what way was Muir affected by his injury?

A. His injured eye healed well very slowly.

B. He could not open his left eye during his exploration.

C. His eyesight was affected, but he was able to carry on.

D. He took a long time to consult maps and study them.

35. When Muir said that he 'botanized', he meant that he

A. Studied plants and made notes on them.

B. Studied plants in their natural habit.

C. Studied plants during his exploration.

D. Studied plants and classified them.

36. Which of these sentences is not true?

A. John Muir explored several new places even on his way home.

B. There was a cloud over the landscape the travelled.

C. He was committed to being a botanist more than ever.

D. He recorded his adventures in the notebook.

37. Direction: Complete the following sentences by choosing the appropriate word/phrase from the options given below.

It came as a shock to me that my friend had lost the_____he had built carefully over the years when in a moment of madness, he lent all of it to his neightbour.

A. nest egg

B. nests and eggs

C. bird's nest

D. nestled eggs

38. During the debate, when the minister appeared to be vague about his stand on the controversial energy project, his opponent asked him to_____and declare outright if the government would go ahead with the project or not.

A. be curt to the face

B. cut to the chase

C. curb the farce

D. cut globe

39. It is irritating when co-workders dismiss your ideas as worthless, and later, present those very ideas as their own. They just want to_____

A. steal your credit

B. steal your crown

C. steal your thunder

D. steal your gloating

40. Before the start of the meeting, I am_____on the latest developments.

A. taking you through

B. going to share

C. going to bring you up to speed

D. going to be explaining

41. Despite statistics to prove that there was a slowdown in the economy of the country, the professor was_____about it.

A. in affirmation

B. in denial

C. in protest

D. in shock

42. After the unearthing of relics at the archaeological site, the historian was asked to_____the significance of the discovery.

A. throw light on

B. shed meaning on

C. turn light on

D. focus meaning on

43. **Direction:** Choose the alternative so that the bold part of the sentence is rendered correct.

The pharmaceutical company hired a consultant to supervise a task force **studying lower salaries as to their effects on employees' morale.**

A. studying what the effects lower salaries would have on employees' morale

B. studying the effects of lower salaries on employee morale

C. for studying what are the effects in employees' morale that lower salaries would cause

D. studying the effects of employee morale on lower salaries

44. Besides offering physiological rewards such as toned muscles, when regular karate is practiced the body can be turned into a dangerous weapon.

A. one can turn the body into a dangerous weapon through karate, if it is practiced regularly

B. the body can be turned into a dangerous weapon as a result of karate if practiced regularly

C. when karate is practiced regularly, the body can be turned into a dangerous weapon

D. karate, if practiced regularly, can turn the body into a dangerous weapon

45. The animal activist has raised awareness not only on the plight of abandoned dogs, but also on overworked bulls and temple elephants.

A. on the plight of not only the abandoned dogs, but also on those of overworked bulls

B. not only on the plight of the abandoned dogs, but also on that of overworked bulls

C. the plight of abandoned dogs, as well as the over worked bulls

D. the plight of abandoned dogs, but also on overworked bulls

46. Direction: Each of the paragraphs given below has a sentence missing which is indicated by a blank. From the choices given below each paragraph, choose the sentence that seems most logically appropriate to complete the paragraph.

When people move from one city or country to another, the spread of diseases may result. People often bring in germs that may not have been present there before. These new germs can spread quickly and cause previously unknown diseases. _____. They become ill more easily and could even die. In turn, newcomers may catch diseases that were not present where they came from.

A. If they had gone back, they would have started an epidemic.

B. Pollution also can lead to the spread of disease.

C. If a germ is completely new to a region, people have not natural protection against it.

D. Such changes may result in enhancing conditions for people who live in big cities.

47. Samar, a young man from a village in Tripura is a social media star who hopes to make it big as a model

and actor. While his minute-long videos are very popular, his series titled, "Who wore it better?" showcases his creative side. He uses a variety of filters and visual effects to improve his videos. _____

A. It is clear that short videos are very popular among the youth than television.

B. This is one of the ways young men make money on the internet.

C. It is possible to be popular on the internet, although making money here difficult.

D. This shows how it is possible today for people with limited resources to express their creativity.

48. Direction: The sentences below have words that are missing. Choose the best option from those given below to complete the sentence.

Coral reefs are one of the most____, biologically complex, and diverse marine ecosystems on Earth. This ecosystem is one of the____paradoxes of the biosphere: how do clear, and thus nutrient-poor, water support such____and productive communities?

A. common, sensitive, fruitful

B. fragile, fascinating, prolific

C. deep, strange, exuberant

D. frail, unrecognized, wealthy

49. It is a____to live in a land without____. Even with all the technological advancement and economic growth, there are still millions who live in war zones where life every day is filled with____.

A. coincidence, prejudice, adventures

B. privilege, bigotry, terror

C. lovely, pride, episodes

D. punishment, hate, agony

50. The ability to_____and _____a cohesive team is particularly critical in hi-tech firms where the _____landscape can shift dramatically in the face of disruptive technologies.

A. mentor, keep, sustainable

B. shape, guide, competitive

C. drive, maintain, tectonic

D. involve, manage, green

51. Cool-headed and rational Jo Eun-cha is a talented and driven anchorman who commands as well as demands respect. After_____to get elected as a news director, he aims to____to his job as the top news anchor to increase his____of being elected the next year.

A. happening, quit, hopes

B. failing, return, chances

C. hoping, upgrade, certainty

D. going, give up, lock

52. A collective investment fund (CIF), also known as a collective investment trust (CIT), is a group of____accounts held by a bank or trust company. The financial institution____assets from individuals and organizations to____a single larger, diversified portfolio.

A. diverse, discounts, conceive

B. different, collected, simulate

C. financial, covered, synthesize

D. pooled, groups, develop

53. Direction: One of the statements below contains a word used incorrectly. Choose the option which has the incorrect or inappropriate usage of the word.

A. The President of the City Chamber of Commerce is an urbane, kindly, and generous man.

B. The writer's next book deals with the life of an urbane intellectual as seen through the eyes of a lawyer.

C. My uncle who lives in New York turned out to be the exact opposite of the urbane, wealthy gentleman that I was expecting to meet.

D. Over 70% of the people living in urban areas said that they wanted better roads and more schools.

54.

A. The young scientist built a small, low-cost machine to recycle wastewater. It was a simple but ingenious solution to the problem of water shortage in the city.

B. My friend is an ingenious cook–she can make very delicious dishes from the most ordinary ingredients.

C. The young man lost all his savings because he was rather ingenious to believe the agent's promises of a well-paid job and comfortable life in a foreign country.

D. Teachers say that some children are very ingenuous when it comes to finding excuses for not completing their work.

55.

A. After several rounds of meetings, the city council passed an ordinance to limit the number of cafes near the seaside.

B. As per a royal ordinance, all men under 18 had to join the army and fight the war.

C. Military aircraft can be used to carry a wide variety of ordinance.

D. The people protested a city ordinance that all parks must be closed by 9 pm.

56.

A. It is a pleasure when we are all together for a meal at home.

B. Her son is not interested in watching movies, which is not all together a bad thing.

C. The three hundred guests sat all together in the large dining hall of the hotel.

D. The facilator asked the participants to stand up, all together.

57.

A. The sickness of a family member can affect the lives of everyone at home.

B. Kerala was affected by the severe flood all through the year.

C. Taking this medicine for a prolonged period can have severe after affects.

D. The popular star was not a natural actor; his style was rather affected.

58. Direction: The sentences are given below when properly sequenced, form a coherent paragraph. Each sentence is labeled with a number. Decide on the most logical order and enter the sequence of numbers in the space provided.

a). However, they stand out because they help the filmmaker realize his artistic vision.

b). An indie film refers to independent films made outside a major studio system.

c). Their release is also limited to a few screens, although there have been films with a wide release.

d). Most of such films are low budget films produced and distributed by small companies.

A. abcd   B. dcab

C. cabd   D. bdca

59. a). Mental illness continues to struggle for recognition as a significant contributor to poor health in spite of the existence of the Mental Healthcare Act 2017.

b). The data reveals that an estimated one in seven Indians – or 197 million person – suffered from mental disorders, at varying degrees of severity, in 2017.

c). There is always more to human health than meets the eye.

d). This is particularly important in the Indian cultural and political context, where the outward appearance of physically well-being is often considered the only visible marker of overall health.

A. dcab   B. abcd

C. abdc   D. cdab

60. a). It was felt that the major polluters had a moral obligation to deliver on the agreements reached some years ago during a similar convention of Climate change.

b). The papers presented indicated that the impacts of current warming are much more severe than previously understood.

c). It appears that the planet's ability to adapt to and cope with how it is being treated is fraying.

d). For example, the acceleration of sea level rise and ocean warming, and increasing risks of reaching limits to adaptation.

e). This is what emerged at a recent conference attended by the largest scientific community on climate science.

A. cebad   B. abdec

C. cdeab   D. bedca

Solutions

1.   D

Sol. $10^{19} = 2^{19} \times 5^{19}$

Total number of factors = (19 + 1) (19 + 1) = 20 × 20 = 400

Now, $10^{15} = 2^{15} \times 5^{15}$

Here, possible values of multiple of 2 = {2^{15}, 2^{16}, 2^{17}, 2^{18}, 2^{19}} $\Rightarrow 5$.

Again, total possible values for multiple of 5 = {5^{15}, 5^{16}, 5^{17}, 5^{18}, 5^{19}} $\Rightarrow 5$

Required probability = $\dfrac{5 \times 5}{400} = \dfrac{25}{400} = \dfrac{1}{16}$

2.   B

Sol. If the length of the three sides of a triangle are consecutive positive integers then the minimum length of the smallest side is 2 and the perimeter of the triangle is less than or equal to 100, so the maximum length of the smallest side is 32.

i.e., 2 ≤ a ≤ 32, where a is the smallest side of triangle.

Note: If the length of the smallest side is 33 then the perimeter = 33 + 34 + 35 = 102 which is more than 100.

Therefore, we get 31 such triangles having the length of the smallest side 2 to 32. But out of these 31 triangles, the first one having sides 2, 3 and 4 is an obtuse angled ($4^2 > 2^2 + 3^2$) triangles and second one having sides 3, 4 and 5 is an right angled triangle ($5^2 = 3^2 + 4^2$).
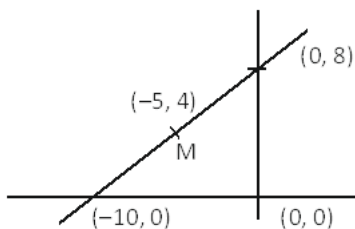
Hence, required number of acute angled triangle = 31 – 2 = 29.

3.   A

Sol. It is given that (–5, 4) divides the line in 1 : 1.

So, Intercept at x – axis, $\dfrac{x}{2} = -5 \Rightarrow x = -10$

Intercept at y-axis, $\dfrac{y}{2} = -4 \Rightarrow y = 8$

Slope intercept formula,

$$\frac{x}{a} + \frac{y}{b} = 1$$

$$\Rightarrow \frac{x}{-10} + \frac{y}{8} = 1$$

$$\Rightarrow -8x + 10y = 80$$

$$\Rightarrow 10y - 8x = 80$$

4.   C

Sol.

$$\cos\frac{5\pi}{8} = \cos\left(\frac{\pi}{2} + \frac{\pi}{8}\right) = -\sin\frac{\pi}{8}$$

$$\cos\frac{7\pi}{8} = \cos\left(\frac{\pi}{2} + \frac{3\pi}{8}\right) = -\sin\frac{3\pi}{8}$$

Now,

$$\cos^2\frac{\pi}{8} + \cos^2\frac{3\pi}{8} + \cos^2\frac{5\pi}{8} + \cos^2\frac{7\pi}{8}$$

$$= \cos^2\frac{\pi}{8} + \cos^2\frac{3\pi}{8} + \left(-\sin\frac{\pi}{8}\right)^2 + \left(-\sin\frac{3\pi}{8}\right)^2$$

$$= \left(\cos^2\frac{\pi}{8} + \sin^2\frac{\pi}{x}\right) + \cos^2\frac{3\pi}{8} + \sin^2\frac{3\pi}{8}$$

$$= 1 + 1 = 2 \;[\because \cos^2 x + \sin^2 x = 1]$$

5.   A

Sol. $\dfrac{1}{1^2} + \dfrac{1}{3^2} + \dfrac{1}{5^2} + \ldots\infty$

$$= \left(\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \ldots\infty\right) - \left(\frac{1}{2^2} + \frac{1}{4^2} + \frac{1}{6^2} + \ldots\infty\right)$$

$$= \left(\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \ldots\infty\right) - \frac{1}{2^2}\left(1 + \frac{1}{2^2} + \frac{1}{3^2} + \ldots\infty\right)$$

$$= \frac{\pi^2}{6} - \frac{1}{4}\left(\frac{\pi^2}{6}\right)$$

$$= \frac{\pi^2}{6} - \frac{\pi^2}{2^4} = \frac{4\pi^2 - \pi^2}{24} = \frac{3\pi^2}{24} = \frac{\pi^2}{8}$$

6. A

Sol. Probability that man speaks the truth = 4/5

Probability that man lies = 1/5

Probability of getting a five = 1/6

Probability to not getting a five = 5/6

Applying Bay's theorem,

Required probability = $\dfrac{\frac{1}{6}\times\frac{4}{5}}{\left(\frac{1}{6}\times\frac{4}{5}\right)+\left(\frac{5}{6}\times\frac{1}{5}\right)} = \dfrac{4/30}{(4/30)+(5/30)} = \dfrac{4/30}{9/30} = 4/9$

7. D

Sol. $log_5\, log_8\left(x^2-1\right)=0$

$log_8\left(x^2-1\right)=5^0=1$

$\left(x^2-1\right)=8^1=8$

$x^2=1+8=9$

$x=3$ *(After neglecting –ve value)*

8. C

Sol.

(i) *put* $x=\dfrac{1}{2}, \dfrac{1}{1+\frac{1}{2}} < 1-\dfrac{1}{2}+\dfrac{1}{4}$

$\Rightarrow \dfrac{1}{3/2} < \dfrac{1}{2}+\dfrac{1}{4}$

$\Rightarrow \dfrac{2}{3} < \dfrac{3}{4}$

$\Rightarrow 0.66 < 0.75$(It is true).

(ii) put $x=\dfrac{1}{2}, \dfrac{1}{1+1/2} > 1-\dfrac{1}{2}+\dfrac{1}{4}$

$\Rightarrow \dfrac{1}{3/2} > \dfrac{1}{2}+\dfrac{1}{4}$

$\Rightarrow \dfrac{2}{3} > \dfrac{3}{4}$

$\Rightarrow 0.66 > 0.75$ (it is not true)

(iv) put $x=-\dfrac{1}{2}, \dfrac{1}{1-\frac{1}{2}} > 1-\left(-\dfrac{1}{2}\right)+\dfrac{1}{4}$

$$\Rightarrow \frac{1}{1/2} > 1 + \frac{1}{2} + \frac{1}{4}$$

$$\Rightarrow 2 > \frac{7}{4}$$

$\Rightarrow 2 > 1.75$ (It is true)

Hence, (i) and (iv) are correct statements.

9. B

Sol. In 50 litres of mixture,

quantity of water = $50 \times \frac{30}{100} = 15$ litres

quantity of milk = 35 litres

In 80 litres of mixture, quantity of water = $80 \times \frac{20}{100} = 16$ litres

Quantity of milk = 64 litres

Now, total quantity of mixture = 50 + 80 = 130 litres

Total quantity of water = 15 + 16 = 31 litres

Total quantity of milk = 35 + 64 = 99 litres

For 25% water, there must be 75% of milk.

75% = 99 litres (milk)

25% = $\frac{25}{75} \times 99 = 33$ litres (water)

Required quantity of water to be added = 33 – 31 = 2 litres.

10. A

Sol. Let three workers be A, B and C respectively.

(A + B + C)'s 1 hour work = 1.

Now, let C takes 2x hours to complete the work then A will take x hours and B will take

(x + 1) hours to complete the work.

Now,

$$\frac{1}{x} + \frac{1}{x+1} + \frac{1}{2x} = 1$$

$$\Rightarrow \frac{3}{2x} + \frac{1}{x+1} = 1$$

$$\Rightarrow \frac{3(x+1)+2x}{(2x)(x+1)} = 1$$

$$\Rightarrow 3x + 3 + 2x = 2x^2 + 2x$$

$$\Rightarrow 2x^2 - 3x - 3 = 0$$

$$x = \frac{3 \pm \sqrt{(-3)^2 - 4 \times 2 \times -3}}{2 \times 2}$$

$$= \frac{3 \pm \sqrt{9 + 24}}{4}$$

$$= \frac{3 \pm \sqrt{33}}{4}$$

$$\Rightarrow x = \frac{3 + \sqrt{33}}{4} \text{ (After ignoring } -ve \text{ value)}$$

Required average time = $\dfrac{x + 2x + (x+1)}{3}$

$$= \frac{4x + 1}{3}$$

$$= \frac{4\left(\dfrac{3 + \sqrt{33}}{4}\right) + 1}{3}$$

$$= \frac{3 + \sqrt{33} + 1}{3} = (\sqrt{33} + 4)/3 \text{ hours}$$

11. B

Sol. Let n(A) = number of students who opted cricket = 70

n (B) = number of students who opted football = 28

n (C) = number of students who opted basketball = 46

$n(A \cap B) = 14, n(A \cap C) = 23, n(B \cap C) = 9, n(A \cap B \cap C) = 4$

So, $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B)$
$- n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$

= 70 + 28 + 46 − 14 − 9 − 23 + 4

= 102

Hence, number of students who did not opt for any of the three subjects = 140 – 102 = 38.

12. A

Sol. g(y) = 2y + f (y)

= 2y + y^2 + log$_3$y

g (3) = 2 × 3 + 3^2 + log$_3$ 3

= 6 + 9 + 1 = 16

13. A

Sol. $Let\ A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

For singular matrix ⇒ |A| = 0

⇒ ad – bc = 0

⇒ ad = bc

Sample space for selecting and arranging four distinct integers randomly from {1, 2, 3, 4, 5, 6}

$= {}^6C_4 \times 4! = 15 \times 4!$

We have to chose four different numbers from given set,

Possible case ⇒ (i) 2 × 3 and 6 × 1 (ii) 3 × 4 and 6 × 2

[Note: Here, we can't take 5 because it will not cancel out by other numbers]

Now, we have to take that numbers from which we can find |A| = 0. So that let matrix be

$\begin{bmatrix} 2 & 6 \\ 1 & 3 \end{bmatrix}$ or $\begin{bmatrix} 6 & 2 \\ 3 & 1 \end{bmatrix}$ or $\begin{bmatrix} 3 & 6 \\ 1 & 2 \end{bmatrix}$ or $\begin{bmatrix} 1 & 3 \\ 2 & 6 \end{bmatrix}$

So, total number of possibilities are 2 × 2 × 2 × 2.

Required probability $= \dfrac{2 \times 2 \times 2 \times 2}{15 \times 4!} = \dfrac{2 \times 2 \times 2 \times 2}{15 \times 4 \times 3 \times 2} = \dfrac{2}{45}$

14. C

Sol. Let investment of Ashok be Rs. X, then investment of Bharat be Rs. x/2 and also let Bharat invested for y months.

We know that,

Ratio of investment = Ratio of Profit

$$x \times 12 : \frac{x}{2} \times y = 3:1$$

$$\Rightarrow x \times 24 : xy = 6:2$$

$$\Rightarrow \frac{24x}{xy} = \frac{6}{2}$$

$$\Rightarrow y = 8 \; months$$

Hence, Bharat joined after (12 – 8 = 4) months of Ashok.

15.   B

Sol.   Total number of marks = 6 × 64 = 384

Since one student got 70 marks so remaining marks = 384 – 70 = 314

Now, 314 marks should be distribute in such a fashion that the difference between second highest and second lowest marks should be maximum.

Let one of the student got 40 marks (since, minimum score is 40).

Remaining marks = 314 – 40 = 274

Now, 274 marks has to be distribute among rest 4 students.

Since, we have to determine difference between second highest and second lowest marks, so we have to keep maximize the marks accordingly.

Let marks obtained by student who got second lowest is 41.

Then remaining marks = 274 – 41 = 233

Now, 233 marks is obtained by remaining three students, keeping this in mind, let us suppose highest marks obtained by one student is 100 and second highest marks obtained by a student is 99.

Clearly 233 – (100 + 99) = 34 marks, which is not possible since minimum obtained marks should be 40.

Now, we check from the options one by one,

From option (A) difference is 50, as second lowest marks is 41 so second highest marks will be 41 + 50 = 91 and highest marks will be 92.

Clearly 233 – (92 + 91) = 50 which can be possible but we have to check other option as second highest marks is 41 so there are chances of other student can get 42 or more than this so considering this go to option (B) i.e. difference is 54.

Then, second highest marks = 41 + 54 = 95 and highest marks = 96.

Now, 233 – (96 + 95) = 42 which is a perfect condition as minimum marks should not be less than 42 and it fulfils all conditions.

Hence, required difference = 54.

16. A

Sol.

For Marico: Profit % = $\dfrac{372-346}{346} \times 100 = 7.51\%$

For HUL; Profit % = $\dfrac{1966-1933}{1933} \times 100 = 1.71\%$

For ITC: Profit % = $\dfrac{253-238}{238} \times 100 = 6.30\%$

Hence, maximum profit will be in the stock of Marico company.

17. C

Sol.

Return on HUL = $\dfrac{1979}{1933} \times 100 = 102.3797$

Return on Britannia = $\dfrac{3140}{3115} \times 100 = 100.8025$

Total return = 102.3797 + 100.8025 = 203.1822

Required percentage return = 203.1822 – 200 = 3.1822 = 3.20 % (approx.)

18. A

Sol. After analysing whole date, we can find that average spread of the stocks is lowest on Monday.

19. B

Sol. Buy price of Britannia on Tuesday = 3101

Sell price of Britannia on Thursday = 3025

Total brokerage fee = $(3101+3025) \times \dfrac{0.1}{100} \times 1000 = 6126$

20. D

Sol. From the given data it is clear that maximum possible profit on ITC stock will be on Friday after buying stock on Monday of ITC.

21. 34

Sol. We know that, Dividend (D) = divisor (d) × Quotient (q) + Remainder (r)

$\Rightarrow$ D = d × q + r

Given, d = 5 $\Rightarrow$ 0 $\leq$ r <5

q × r = 24 and q + r = 10

So, possible values of q and r be 6 and 4 respectively as product of quotient and remainder is 24.

Therefore, D = 5 × 6 + 4

= 34

22. 4

Sol. Shortest distance = $\sqrt{x_1^2 + y_1^2}$ – r

$= \sqrt{(-4)^2 + (3)^2}$ – 1 (Here $x_1 = -4, y_1 = 3$ and radius, r=1)

$= \sqrt{16 + 9}$ – 1

$= \sqrt{25} - 1 = 5 - 1 = 4$

23. 16

Sol. $0.04^{\log_{\sqrt{5}}\left(\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+....\right)}$

$= 0.04 \log_{\sqrt{5}}\left(\frac{1/4}{1 - 1/2}\right) \left[\begin{array}{l} \because For \text{ GP series, } S_\infty = \dfrac{a}{1 - r} \\ where \text{ a is the first term and r is the common ratio} \end{array}\right]$

$= 0.04^{\log_{\sqrt{5}}\left(\frac{1}{2}\right)}$

$= \left(\frac{4}{100}\right) \log_{5^{1/2}}(1/2)$

$= (5^{-2})^{\log_{5^{1/2}}(1/2)}$

$$= (5^{-2})^2 \log_5(1/2) \left[\because \log_{a^n}(m) = \frac{1}{n} \log_a(m) \right]$$

$$= (5)^{-4 \log_5(1/2)}$$

$$= 5^{\log_5 \left(\frac{1}{2}\right)^{-4}} = \left(\frac{1}{2}\right)^{-4} = (2)^4 = 16 \left[\because a^{\log a^x} = x \right]$$

24. 1

Sol.
$$\begin{vmatrix} a & a^2 & a^3 - 1 \\ b & b^2 & b^3 - 1 \\ c & c^2 & c^3 - 1 \end{vmatrix} = 0$$

$$= \begin{vmatrix} a & a^2 & a^3 \\ b & b^2 & b^3 \\ c & c^2 & c^3 \end{vmatrix} - \begin{vmatrix} a & a^2 & 1 \\ b & b^2 & 1 \\ c & c^2 & 1 \end{vmatrix} = 0$$

Taking a, b and c common in first determinant and interchange column 3 to 2 and then column 1,

$$abc \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} - \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = 0$$

$$\Rightarrow (abc - 1) \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = 0$$

$$\Rightarrow abc - 1 = 0 \Rightarrow abc = 1$$

25. 7

Sol.
$$3 - x = 0 \qquad \Rightarrow x = 3, \text{ then } f(3) = 7$$

$$2 + x = 0 \qquad \Rightarrow x = -2, \text{ then } f(-2) = 12$$

For $5 - x = 0 \qquad \Rightarrow x = 5, \text{ then } f(5) = 9$

Therefore, minimum value of f (x) = 7.

26. 100

Sol. Let the price of one pen be x and price of one pencil be y.

From first visit of Ashok, 2x + 3y = 86 ……. (i)

From second visit of Ashok, 4x + y = 112……. (ii)

From (i) and (ii), x = 25 and y = 12

Now, it is given that during second visit Ashok purchased four pens.

So, amount of pen during second visit = 4 × 25 = Rs. 100

27. 7920

Sol. Let four digit number be PQRS where P, Q, R and S are thousands digit, hundred digit, tenth digit and unit's digit respectively.

According to the question. P × S = 0 and P – S = 7 also, Q × R = 18

Here, we have to analyse all the given information and after analysing we get value of

P = 7, S = 0, Q = 9 and R = 2.

So, possible four-digit number = 7920.

28. 80

Sol. Number of students who passed in mathematics (M) = 50

Number of students who passed in physics (P) = 30

Number of students who passed in chemistry (C) = 40.

Let maximum number of students who appeared in all three exams = 20.

Now, we have to analyse that what could be the maximum number of students who could have passed all the three exams.

If we subtract 20 among all students who passed in three different papers, then

(50 – 20) + (30 – 20) + (40 – 20) = 30 + 10 + 20 = 60

Now, maximum number of students who could passed all three exams = 60 + 20 = 80

It is a possible case for maximum number of students.

Hence, maximum number of students who could have passed all three exams = 80.

29. 3

Sol. Number of rounds = 3000/300 = 10 $\left[\because 3KM = 3000m \right]$

Ratio of speed = 3 : 2, it means if first one completes 3 rounds then second one completes 2 rounds and it also mean winner passes runner one times.

So,

Number of round for winner	Number of round for runner	Number of times passes to each other
3	2	1
3	2	1
3	2	1
1	2/3	0

Required number of passing to each other = 1 + 1 + 1 + 0 = 3 times

30. 256

Sol.

Same object	Different object
0	4
1	3
2	2
3	1
4	0

Required number of ways

$$= 1 \times 9_{C_4} + 1 \times 9_{C_3} + 1 \times 9_{C_2} + 1 \times 9_{C_1} + 1 \times 9_{C_0}$$

$$= 9_{C_4} + 9_{C_3} + 9_{C_2} + 9_{C_1} + 9_{C_0}$$

We know that,

$$n_{C_0} + n_{C_1} + n_{C_2} + \ldots + n_{C_n} = 2^n$$

$$So, 9_{C_0} + 9_{C_1} + 9_{C_2} + \ldots + 9_{C_9} = 2^9$$

Also we know that,

$$9_{C_0} = 9_{C_9} \left[\because n_{C_0} = n_{C_n} \right]$$
$$9_{C_1} = 9_{C8} \left[\because n_{C_1} = n_{C_{n-1}} \right]$$
$$9_{C_2} = 9_{C_7}, \ldots$$

So, we can write,

$$2 \left[9_{C_0} + 9_{C_1} + 9_{C_2} + 9_{C_3} + 9_{C_4} \right] = 2^9$$
$$\Rightarrow 9_{C_0} + 9_{C_1} + 9_{C_2} + 9_{C_3} + 9_{C_4} = \frac{2^9}{2} = 2^8 = 256$$

Hence, required number of ways = 256.

31. C

Sol. From the passage, it can be easily inferred that John Muir's love for botany never fluctuated, even when he suffered damage to his right eye. His love for botany was far-reaching and he was an avid explorer of the land. Hence, option C is the right answer.

32. A

Sol. Refer to these lines:

"But usually I had no great difficulty in finding a loaf of bread in the widely scattered clearings of the farmers."

Hence, option A is the right answer.

33. A

Sol. Refer to these lines

"No less does this refreshingly cosmopolitan address, which might have startled any finder of the book, reveal the temper and the comprehensiveness of Mr. Muir's mind. Even at the early age of twenty-nine, his eager interest in every aspect of the natural world had made him a citizen of the universe."

Except for option A, no other options try to point out the different ways in which nature fulfilled his soul. Hence, it is the right answer.

34. C

Sol. Refer to these lines:

"The injury to his eye proved to be less serious than he had at first supposed. In June he was writing to a friend: "I have been reading and botanizing for some weeks, and find that for such work I am not very much disabled.""

Hence, option C is the right answer.

35. B

Sol. Botanize means to study plants in their natural habitat. Hence, option B is the right answer.

36. B

Sol. Refer to these lines:

"I botanized one week on the prairie about seven miles southwest of Pecatonica…. To me all plants are more precious than before. My poor eye is not better, nor worse. A cloud is over it, but in gazing over the widest landscapes, I am not always sensible of its presence.""

Hence, option B is the right answer.

37. C

Sol. Only option C logically follows the statement as no human can build eggs while one can build a bird's nest. Hence, option C is the right answer.

38. B

Sol. The phrase "cut to the chase" means to come straight to the point without talking nonsense. As the minister appeared to be vague, he must be talking here and there, and hence, option B is the right answer.

39. C

Sol. The phrase "steal someone's thunder" means to win praise for oneself by using someone else's ideas. Hence, option C is the right answer.

40. C

Sol. "Bring someone up to speed" means having all the latest information about something. Hence, option C is the right answer.

41. B

Sol. Option B is the right answer here. The usage of the word 'despite' hints towards the contrasting elements present in the statement. Hence, we need to use the phrase, which brings forth this contrast. Hence, the professor must be in denial of the slowdown of the economy.

42. A

Sol. The phrase 'to throw some light on' means to reveal information about something. Hence, option A is the right answer.

43. B

Sol. Option B is the right answer here. It presents us with the most apt description of the situation at hand. Options A and C are incorrect because of improper sentence structure while option D is wrongly framed because there can be no impact on salary. Rather, the impact falls on morale.

44. C

Sol. Option C is the right choice here. Options A B and D turn the original statement into a conditional statement via the usage of the word 'if'.

45. A

Sol. Option A is the right answer here because it follows the correct sentence structure. The sentence connector 'Not only, but also' is usually preceded by the verb and hence, option A is the right answer.

46. C

Sol. For this question, the key is to focus more on the statement after the blank. Since the next statement talks about the spread of disease, the one in the blank should also talk about it. Hence, options A and D are rejected. Now, pollution is completely out of the scope of the passage, Hence, option B is rejected as well. Hence, option C is the right answer.

47. D

Sol. Options D sums up the paragraph in a clear and lucid way while the rest of the options are unable to do so. Hence, option D is the right answer.

48. C

Sol. Options B and D can be rejected because we can't say that coral reefs are fragile or weak. Now, option A is incorrect because it is more apt to brand a paradox as strange rather than considering it sensitive. Paradox, by their very nature, are strange and hence, option C is the right answer

49. B

Sol. Since war zones are mentioned in the sentence, the words to be filled in the blanks should have negative connotations. Hence, Options C and B are eliminated. Now, option A is rejected

because we can't say that life in a war zone is filled with adventure. Hence, option D is the right answer.

50. B

Sol. Since high-tech firms are being talked about, the context should contain a word that describes the competitiveness and disruptiveness that the business had to face. Hence, option B is the right answer.

51. A

Sol. If Jo has to increase his chances of being elected next year, he needs to quit his job to increase his hopes of doing so. Hence, option A provides us with the logical flow, and hence, it is the right answer.

52. A

Sol. Option D is incorrect because the word 'pooled' means the same as a group. Since the investment trust will contain a financial account, it is inept to use financial as well. Hence, option C is rejected, Now, option A is correct because the whole sentence is in present tense while option B is in the past tense.

53. C

Sol. Option C is the correct answer here. Since New York is mentioned in the sentence, the word to be used here should be 'urban', not 'urbane', which refers to a polished and sophisticated personality.

54. D

Sol. Option D is incorrect because the word ingenuous means someone innocent. And the ones who finds excuses for not completing their work are not innocent.

55. C

Sol. The word 'ordinance' means an order or ruling dished out by the authorities. Hence, option C is the right answer.

56. B

Sol. Option B is the right answer here. The word to be used here should be altogether, which means overall or in total. Hence, option B is the right answer.

57. C

Sol. Option C is the right answer. The word 'affect' is a verb while the word 'effect' is a noun and in this statement, we need the word effect to complete the sentence.

58. D

Sol. Here, we just need to find the sentence which introduces us to the primary subject of the passage. And since statement b introduces us to Indie films, it should be the introductory statement. Hence, option D is the right answer.

59. B

Sol. Statement a introduces us to the main topic of the passage and hence, options A and D are rejected. Now, option C is incorrect because statement c hints towards adding some more layer of information to our data. Hence, option B is the right answer.

60. C

Sol. Statement c is clearly the opening statement of the passage as it introduces us to the issue of deteriorating living habitat. Now, statements e and a are linked via because of the convention on climate change. Hence, option C is the right answer.